the decrease in the rate depending upon the strength of the acid; the weaker the the acid the greater the inhibiting action of its salt. The action of acetic acid is completely paralyzed by the presence of sodium acetate equivalent to the proportion of the acid. The effect of a salt other than the salt of the acid used for the inversion depends upon the relations established between the acid and the salt. An example would be HCl in the presence of sodium acetate; NaCl and acetic acid are formed. If the acetate is present in sufficient quantity, all of the HCl is replaced by acetic acid, and if the acetate is still in excess, we have inversion by acetic acid in the presence of its sodium salt, in which case the hydrolysis is always inhibited. The author offers a similar explanation for a situation reported by Davis and Daish. They found that 2 per cent citric acid was sufficient to invert a solution of cane sugar by boiling 10 minutes, but it was without effect in the presence of a certain quantity of sodium acetate. The citric acid reacted with the sodium acetate, giving sodium citrate and liberating an equivalent amount of acetic acid, the action of which was paralyzed by its sodium salt still present in the solution.—Charles O. Appleman.

Effect of different oxygen pressures on carbohydrate metabolism of sweet potatoes.—The experiments reported by Hasselbring[11] in this paper were designed primarily to effect a further separation of the various steps in the transformation of starch to sugar in sweet potatoes. For this purpose different oxygen pressures were employed. When the sweet potatoes are killed under a gas pressure of 5 atmospheres, starch hydrolysis is greatly depressed or inhibited. In the living potatoes starch hydrolysis and cane sugar formation proceeded in the absence of oxygen in the same manner as in air or in an atmosphere of oxygen. Cruickshank working with barley seed, and Boysen-Jensen working with germinating barley and peas, found that cane sugar was not formed in the absence of oxygen. These investigators conclude that the presence of oxygen is one of the necessary conditions for cane sugar formation, but since this was not found to be the case with sweet potatoes, the conclusion is not of general applicability.

Anaërobic respiration in sweet potatoes consumes, in a given period of time, a greater quantity of material than is consumed by normal respiration. The energy derived from a given mass of material is less in anaërobic than in normal respiration. These facts, coupled with the observation that cane sugar is formed with equal facility under anaërobic and aërobic conditions, lead the author to believe that his experiments in a general way support the Boysen-Jensen theory that the respiratory processes furnish the energy for the synthesis of cane sugar. In the case of the sweet potato this energy could be furnished by anaërobic respiration.

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[11] Hasselbring, Heinrich, Effect of different oxygen pressures on the carbohydrate metabolism of the sweet potato. Jour. Agric. Research 14:273–284. 1918.

Another very interesting fact brought out by the author's work on sweet potatoes is the apparent stability of cane sugar in relation to the respiratory processes in these roots, as cane sugar does not seem to be consumed by either anaërobic or normal respiration.—CHARLES O. APPLEMAN.

Analysis of quantitative variation.—BROTHERTON and BARTLETT[12] have presented the results of a very significant piece of research. The investigation as it stands belongs to the field of plant physiology, but probably it is most significant in the bearing upon certain problems of genetics. Plants of *Phaseolus multiflorus* grown in light and darkness were compared as to length and number of epidermal cells of a given internode. For the physiologist the results may be summarized in the following statement: "The effect of light is that it retards extension of the cells, and that as an indirect result there are fewer secondary divisions, since relatively fewer primary cells enter the range of length within which division takes place." For the geneticist we quote the following: "The mathematical formulation of the results of size inheritance according to the multiple factor hypothesis should be paralleled by a biological analysis, the object of which is the identification of the several factors concerned." Thus size differences may be resolved into number or size of constituent cells or both. "In the investigation of quantitative variations of a hereditary nature it seems likely that the study by the histological method of reactions to the environment and of the obscure reaction known as 'vigor of heterozygosis' will afford a means of correcting for these disturbing factors." It is probably true that heritable size differences express themselves directly in the cells of tissues deeper than the epidermis, and that the change in the epidermis amounts merely to a mechanical response to these forces within. It would probably be advisable, therefore, to carry the analysis to more significant tissues.—MERLE C. COULTER.

Root growth in cuttings.—CURTIS[13] has published an important contribution to the physiology of root formation in cuttings. A number of forms were used, but *Ligustrum ovalifolium* furnished most of the experimental material. Nutrient solutions of the strengths used in culture work with seedlings were found to be distinctly injurious to woody cuttings. Treatments with potassium permanganate resulted in a very marked increase in root growth of various woody cuttings. After discussing several possible explanations for this stimulation, the author concludes that it is most probable that the potassium permanganate increases respiratory activity by catalytically hastening oxidation. It is known that when potassium permanganate comes in contact with organic matter manganese dioxide is precipitated and oxygen is liberated. There was

[12] BROTHERTON, WILBER, and BARTLETT, H. H., Cell measurement as an aid in the analysis of quantitative variation. Amer. Jour. Bot. 5:192–206. 1918.

[13] CURTIS, OTIS F., Stimulation of root growth in cuttings by treatment with chemical compounds. Cornell Univ. Agric. Exper. Sta. Memoir 14:71–138. 1918.